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Consumer Behavior as a Potential Acceptance of Renewable Energy Source in Indonesia

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Abstract
The trend of using renewable energy (RE) as a substitute for fossil energy is increasing as the issue of global warming continues to be echoed. Previous studies about RE focusing much on the availability and infrastructure of RE, yet no study about potential acceptance of RE in Indonesia has been conducted. Therefore, this study will fill the gap in the topic of RE consumer behavior. Qualitative approach was used in this study, by conducting literature reviews to relevant studies about consumer behavior towards RE in various countries. The results show that income, education level, infrastructure, and government policies will have a major influence in the transition process. The government occupies a strategic position with the authority in terms of supportive policies, fulfillment of infrastructure, and education of the public as potential consumers. Two scenarios are proposed for starting a shifting energy campaign in Indonesia. Finally, this study aims to enrich the contribution of communication science in the field of energy security. It can also be a reference for comparison for similar studies that focus on communication issues related to RE.
Keywords: Consumer behavior; product awareness; product attitude; renewable energy; government policies.

Introduction

The trend of using renewable energy as a substitute for fossil energy is increasing as the issue of global warming continues to be echoed. The use of fossil or non-renewable energy in Indonesia described by Kholiq (2015), for example, natural gas consumption increased from 87.2 million BOE (Barrels of Oil Equivalent) in 2000 to 125.3 million BOE in 2012 with an average growth rate of 2.8% per year. Besides, electricity consumption within 2000-2012 experienced an average growth of 6.2% per year, yet still showing lower growth than coal (9.9%) and LPG (13.5%). This data show an increasing trend, meanwhile, assuming petroleum reserves now stands at 3.9 billion barrels. Therefore, renewable energy is urgently needed.

Renewable energy is defined as energy obtained from processing raw materials that continuously available on Earth. Thus, the energy used by human can be sustainable as it is available or continuously produced or exists in our environment. Globally, there are some countries starting to utilize RE such as South Korea investing in solar and wind energy (Alsharif, Kim, & Kim, 2018), biomass in Norway (Lyng, Skovsgaard, Jacobsen, & Hanssen, 2020), hydro power in the

Netherlands (Marence, 2019), and so forth. In Indonesia, the developments of RE source are in type of biodiesel and biogas (Heyko, Hasid, & Priyagus, 2016), solar power (Boedoyo, 2013; Hasan et al., 2012), geothermal (Fandari, Daryanto, & Suprayitno, 2014; Umam, Purba, & Adityatama, 2018), wind (Nakhoda & Saleh, 2015; Habibie, Sasmito, & Kurniawan, (2011) and waste including biomass (Kuswahyono, 2013; Pranoto, Anggrahini, & Efendi, 2013). The aforementioned RE typology studies show scholars' interests in development of RE supply.

In the same vein, in Indonesia, previous studies about RE focused on discovering, developing, and the policy for RE. For example, a study by Kholiq (2015) discussed an renewable energy to replace fuel oil. Another study by Heyko, E., Hasid, Z., & Priyagus, P. (2016) showed the efforts of the East Kalimantan region to utilize biodiesel and biogas which are considered the most feasible as fuel substitutes to a conservative strategy (self-improvement). A study by Pinilih and Chairunnisa (2019) identified policies to support RE development in Indonesia. On the other hand, Priyarsono, Tambunan, and Firdaus (2010) showed the reduced availability of fossil energy and the need for renewable energy utilization and development. In conclusion, studies about RE in Indonesia are still available to be developed from many perspectives.

Based on the aforementioned studies, it depicts the role of Government as a supplier of RE. Shifting from fossil energy to RE should be done together and gradually from all sides, supply and demand, both government and society as a consumer. Moreover, in some countries, to promote the use of green energy, demand for green electricity needs to be increased before increasing the number of sources for electricity supply (Baležentis & Štreimikien, 2019; Hast, Syri, Jokiniemi, & Huuskonen, 2015). Therefore, this study is aimed at identifying the demand side from the lenses of consumer behavior.

Consumer behavior is the study of the processes involved when individuals or groups select, purchase, use, or dispose of products, services, ideas, or experiences to satisfy needs and desires (Solomon, 2006). In that process, this study will only focuses on potential consumer awareness and attitude towards RE in Indonesia. Awareness can be defined as knowledgeable being conscious; cognizant, informed alert. Awareness is the state or ability to perceive, to feel, or to be conscious of events, objects, or sensory patterns (Gafoor, 2012). In the study of consumer behavior, before individuals are able to select a product, they have to be aware of the product. Therefore, it is important to make sure that potential consumers have awareness about the product before going to the further steps.

Another important step in consumer behavior is attitude. Attitude in general means a lasting, general evaluation of people (including oneself), objects, advertisements, or issues (Madichie & Gallant, 2012). Before individuals select certain product, their awareness will help evaluate the possibility of cost and benefit for consuming the product. As a cost, price is one of determinants for individuals to select and thus purchase the product. Regarding that, this study will focus on consumer awareness and willingness to pay (WTP).

In conclusion, this study aims to make an initial identification regarding the description of potential consumers' acceptance toward RE in Indonesia. To achieve the objective, literature review of relevant studies from different countries will be collected and analyzed. To clarify the direction of this study, the research question is "how far does the global society have awareness about RE and what determinants influence society for shifting the energy usage to RE?"

Theoretical Framework

The processes are involved when individuals or groups select, purchase, use, or dispose of products, services, ideas, or experiences to satisfy needs and desires called consumer behavior (Solomon, 2006). In this case, before selecting a product, an individual needs to have product awareness. Awareness can be defined as knowledgeable being conscious; cognizant, informed alert. Awareness is the state or ability to perceive, to feel, or to be conscious of events, objects, or sensory patterns (Gafoor, 2012). In the study of consumer behavior, before individuals are able to select a product, they have to be aware of the product. Therefore, it is important to make sure that potential consumers have awareness about the product before going to the further steps.

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Material and Methodology

Methods are the means used by the author to answer the existing research problem. The method must align with the location and time of the research, the population and sample of the research, the research variables and the research data. The method of your manuscript also mention in detail.

In this study, literature review was conducted to answer the research questions. Leech and Onwuegbuzie (2011) stated that conducting a literature review is similar to conducting a research study, with the information that the literature reviewer collects representing the data. Moreover, Onwuegbuzie and Frels (2013) stated that literature review represents a method since it chooses from an array of strategies and procedures for identifying, recording, understanding, meaning-making, as well as transmitting the relevant information to a topic of interest. To answer the research questions, relevant prior studies to consumer awareness and willingness to pay (WTP) from different countries were collected. The studies must be published within 2010-2020 in order to obtain similar characteristics of society.

On the next steps, data from studies collected were categorized into group of consumer awareness and consumer attitude. This categorization helps to do comparison of ideas and discussing the possible explanation about that. In the end, once the research questions were answered, the possible scenario for shifting to RE usage in Indonesia can be formulated.

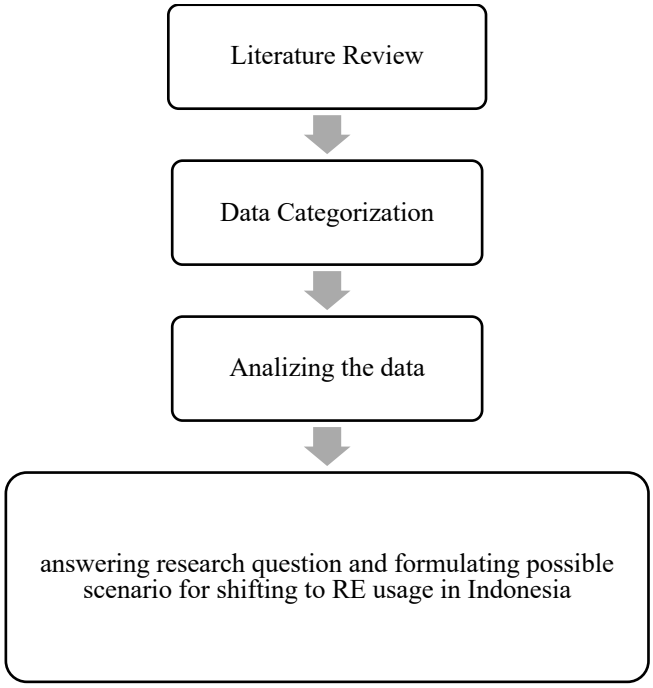

Figure 1. Research Flow
Source: self-designed, 2020

Result and Discussion

Consumer awareness has a wide range of scope, such as having a little knowledge to deeper one about RE, knowing the advantages of using RE, or even experiencing to try or witnessing people using or developing RE. Awareness is a prerequisite which needs to be understood before adoption can be addressed. Having awareness about RE, it influences people' willingness to use as well as to pay (WTP) the RE to replace fossil energy. Table below presents summary of literature review of consumer awareness and WTP.

Table 1. Summary of Literature Review

Topic	Country	Study result
Consumer Awareness (CA)	China (Zhang, Ye, Law, & Li, 2010)	there is increasing awareness about renewable energy
	USA (Bird & Sumner, 2011)	71% of the population were aware of renewable energy
	China (Qunhui & Yang, 2011)	rural residents generally support the development of renewable energy.
	Portugal (Ribeiro, Ferreira, Araújo, & Braga, 2014).	the public has shown a positive attitude towards investing in innovative renewable energy sources, and this social attitude is more pronounced for solar projects and new hydropower units
	South Korea (Shin, Woo, Huh, Lee, & Jeong, 2014)	most of the people support policies that promote a form of RE
	Greece (Ntanos, Kyriakopoulos, Chalikias, Arabatzis, & Skordoulis, 2018)	More than half of the respondents have an in-depth knowledge of solar energy systems and wind energy technology.
	Qatar (Al-Marri, Al-Habaibeh, & Watkins, 2018)	user's education and awareness of the environmental impact is dependent on efficient energy monitoring and usage. People are less motivated to use RE because of economic means.
	China (Behrang Vand et al., 2019)	lack of knowledge and awareness about renewable energy sources (e.g., solar, wind and nuclear)
	Malaysia (Illias, Ishak, & Alam, 2020)	Level of education, current economic condition, and RE information exposure considered influencing people perception.
Willingness to Pay (WTP)	USA (Bird & Sumner, 2011)	At least, 7% of the population bought some of their home's power from a renewable source
	China (B Vand et al., 2015)	WTP of RE for young and educated people was influenced by income, type of building, accessibility of renewable energy sources.
	Mix : meta-regression analysis (Ma, C., Rogers, A. A., Kragt, M. E., Zhang, F., Polyakov, M., Gibson, F., & Tapsuwan, 2015)	factors that influence willingness to pay in individual studies, such as renewable energy type, consumers' socio-economic profile and consumers' energy consumption patterns
	Italy (Caporale & De Lucia, 2015)	WTP is influenced by income, age, education, and environmental awareness.
	China (Hast et al., 2015)	Beside income, features of technology used are consiedered important
	Europe (Karaoğlan & Durukan, 2016)	consumers with a high level of environmental awareness are willing to pay more for renewable energy.
	France (Enevoldsen & Sovacool, 2016)	WTP is influenced by income, age, education, and environmental awareness.
	China (Ing, Keong, Hong, Yan, & Wei, 2017)	The economic trend influences WTP
	Greece (Ntanos et al., 2018)	WTP is positively related to education status, subsidies provided by the state, measures to expand renewable energy sources by the state and motivation related to the socio-political framework.

Generally, global consumer have awareness about RE, that may have different depth of knowledge and further following up action due to several determinants. For example, consumers may have awareness about RE importance, yet economic factor is a great determinant for consumers. In Qatar (Al-Marri et al., 2018), it is stated that there is a correlation between energy consumption trends and education. Improving education aims to gain a full understanding of why energy conservation is imperative. However, due to the presence of fossil energy subsidies in Qatar, people are not motivated using RE. In a contrary, the study by Ntanos, et al. (2018) shows that the prolonged economic recession in Greece has based citizens to conduct market research related to cost-effective energy options, especially those related to their household expenses. More than half of the respondents have an in-depth knowledge of solar energy systems and wind energy technology. In Malaysia (Illias et al., 2020), the study was conducted to identify the awareness of secondary students about RE. The result showed that students at higher level of secondary school have better understanding of RE. They are more aware of RE benefits to the environment, Malaysian government's incentives for RE technology, and have a higher willingness to invest in renewable energy technology.

Another point of view about consumer awareness is about the relevant terms to RE. In the USA (Bird & Sumner, 2011), it was identified people' awareness of the term of "carbon footprint", "renewable power", and "carbon offset". It is stated that people on the West Coast are significantly more aware of these three terms than those in other regions who have statistically equivalent awareness. West Coast residents are often thought to be more attuned to environmental issues than consumers elsewhere in the country. However, even in the West, nearly one-quarter of the population is unaware of the term renewable power. In contrast, study by Behrang Vand et al., (2019) in Shanghai, China, reported that the respondents lacked knowledge and awareness about renewable energy sources (e.g., solar, wind and nuclear). On the other hand, most of the respondents were familiar with hydro, wind, solar, biomass, tidal and geothermal power. I seems that respondents did not know that some of these impacts are driven by fossil fuels and other common electricity sources and that this problem can be solved, partially or wholly, by the RE.

The last point of view is awareness that has been represented in the positive attitude. A study by Zhang, Ye, Law, and Li (2010) shows that there is increasing awareness on the part of citizens in China about renewable energy sources and systems are urgently needed, especially this study discusses "Green Houses". Qunhui and Yang, (2011) investigated the social acceptance of renewable energy in eastern China (a case study was the Shandong region, a rural area) through a questionnaire survey showing that rural residents generally support the development of renewable energy. In South Korea, active ecological awareness has been reported among citizens; most of them support policies that promote a form of renewable energy that remains the property of the state (Shin et al., 2014). In Portugal, the public has shown a positive attitude towards investing in innovative renewable energy sources, and this social attitude is more pronounced for solar projects and new hydropower units (Ribeiro et al., 2014).

It can be concluded that in general, people have awareness about modifying the energy use into RE. Based on the studies, level of education and exposure to daily energy usage can be a determinant of their depth knowledge of RE. Some of them are not aware yet that fossil energy has a negative impact on the environment, thus, even though they have awareness about RE source, only few were urged to change their source of energy. Lastly, government has always a power to give more motivation to people' to follow up on action after having awareness about RE, such as RE technology investment, subsidies, and supporting regulation.

After understanding consumer awareness, further step is identifying what motivates consumers to spend some amount of money on using RE or Willingness To Pay (WTP). According to previous research (Arabatzis & Myronidis, 2011; Caporale & De Lucia, 2015; Enevoldsen & Sovacool, 2016), the willingness to pay (Willingness To Pay / WTP) is influenced by factors of income, age, education, and environmental awareness. In the same vein, several studies below show similar result with different empasize such as urban area, as well as technology and RE preference.

Living in urban areas with a fairly dense population, the priority of the community is still

very much considering the consumption of cost-effective goods and services, not because of environmental protection. In this situasion, a study by Ntanos et al. (2018) shows that WTP is positively related to education status, subsidies provided by the state, measures to expand renewable energy sources by the state and motivation related to the socio-political framework.

On the other hand, technology and RE preference are appealing for some consumers before shifting to RE. Hast et al. (2015) found that the WTP of renewable energy in Shanghai, China, was influenced by income, type of building, accessibility of renewable energy sources and the possibility to choose a water heating and cooling system. Meta-regression analysis conducted by Ma, C., Rogers, A. A., Kragt, M. E., Zhang, F., Polyakov, M., Gibson, F., and Tapsuwan, (2015) stated that people' WTP might be different from one to another based on the RE type, context variables, people's socio-economic profile and their energy consumption patterns. People have significantly higher WTP for electricity generated from solar or generic (i.e. no indication of a specific source) renewable energy sources than for wind, hydro or biomass. Additionally, WTP for RE was positively associated with the RE penetration in current energy consumption and the RE share in a proposed energy portfolio, but negatively associated with current household electricity consumption level.

The other factor that affects consumers' WTP is having an expectation for a greater future. Vand et al., (2015) show that in the Shanghai region, young and educated people can become the initial market focus in voluntary shifts in the use of renewable energy, especially if the government supports it by providing tax exemptions or other financial support mechanisms. This is due to the influence of willingness to change according to income and knowledge about the use of energy itself. A study by Karaoğlan and Durukan (2016) identified respondents in Europe showing how consumers with a high level of environmental awareness are willing to pay more for renewable energy. The intention is, of course, related to each other's financial capabilities, so that a comfortable economic position guarantees an increased willingness to pay for electricity obtained from renewable energy. Apart from economic factors, the area of residence influences people's perceptions and behavior towards the use of renewable energy. The environmental awareness of a person facing air pollution in the city may be different from the environmental awareness of someone who grows or lives in a relatively natural environment (Karaoğlan & Durukan, 2016). In the USA, research conducted by National Renewable Energy Laboratory (Bird & Sumner, 2011) stated that consumer price sensitivity for renewable energy has increased over the past five years (2006-2011). In 2010, 16% of the population reports that they would pay 20% more for products made in an environmentally-friendly and sustainable way, whereas one-quarter will pay $5–$20 more each month for renewable energy, which covers the premium in many cases. It is stated on this report that simply providing consumers with greater awareness of their purchase options may be the most important factor in growing the renewable energy market.

Additionally, to add other point of views, studies reveal obstacles might be faced in the attempt to implement RE. Obstacles to the application of renewable energy certainly do exist, and can affect the behavior of people as potential consumers of RE. Sun and Feng (2012) as well as Gliedt and Hoicka (2015) studied the existing barriers to green energy in China and they suggested several policies to overcome, such as appropriate laws and proper systems, strong manufacturing support, increasing public awareness and reducing these barriers to increase consumers' Willingness To Pay (WTP) for RE. Besides, the study by Ing, Keong, Hong, Yan, and Wei (2017) shows that the stability of the local and global economy also influences, in addition to personal economic factors, the use of renewable energy. Regarding that, highlighting some points disscussed on consumer awareness and WTP is highly related to economic reasons. Both consumers in Greece and in Qatar have awareness about RE. However, subsidies provided by the state made consumers in Greece interested to shift the energy usage into RE meanwhile in Qatar the subsidies are given to fossil energy used.

To conclude some points for WTP, most determinants to WTP of RE are income, education, technology and RE preference, as well as environmental awareness. It is proposed that young, educated people in urban areas to be the most potential consumers for RE. lastly, supporting laws, systems, and infrastuctures by government play a huge role in shifting behavior into RE usage.

Thus, the discussion above shows the tendency of consumer behavior in consuming renewable energy. The consumption behavior is related to the condition and personality of each, such as values related to environmental preservation and general concern for the environment, as well as economic factors. The use of renewable energy on a large scale certainly requires the role of the government, both in the form of the availability of infrastructure, policies, and campaigns to the people. With a different character of people, the government can start a campaign for the use of renewable energy to start with which group or potential consumer. If subsidies cannot be provided, then pro-environmental groups with middle and upper income levels will be suitable to start using renewable energy. On the other hand, if subsidies and infrastructures are considered sufficient, people with lower middle income will be interested in using RE.

Conclusions

Renewable energy as an alternative to fossil energy is quite accepted by the global community. The urgency of using renewable energy continues to increase due to the depletion of fossil energy availability and global warming conditions. Shifting to RE in Indonesia should be well-prepared in terms of both supply and demand. Supply means preparing the availability of RE, infrastructures, subsidies, systems, and laws, while demand is related to people as potential consumers that need to be educated about RE and classified according to their socio-economic profile. Based on previous studies, income, education level, infrastructures, and government policies will have a big influence on the transition process. The government holds a strategic position with the authority in terms of supporting policies, fulfilling infrastructures, and educating the public as potential consumers.

This study certainly has limitations since it has limited access to the relevant papers and time constraint to collect and analyse more studies. Moreover, because of the pandemic, it was hard to gather people for more offline discussion, while online meeting faced difficulties due to a lack of technology skills on the respondents side. Lastly, the study development on consumer behavior toward RE in Indonesia has many possibilities to be explored.

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